3GPP TSG RAN Meeting #71 **RP-160540**
Gothenburg, Sweden, 7th – 10th March 2016

Source:	**Huawei, Intel Corporation, China Telecom**
Title:	**New WI proposal: Signalling reduction to enable light connection for LTE**
Document for:	**Approval**
Agenda Item:	**10.1.2**

3GPP™ Work Item Description

For guidance, see 3GPP Working Procedures, article 39; and 3GPP TR 21.900.
Comprehensive instructions can be found at http://www.3gpp.org/Work-Items

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Title: Signalling reduction to enable light connection for LTE

Acronym: LTE_ LIGHT_CON

Unique identifier:

NOTE: If this is a RAN WID including Core and Perf. part, then Title, Acronym and Unique identifier refer to the feature WI. Please tick (X) the applicable box(es) in the table below:

This WID includes a Core part	**X**
This WID includes a Performance part	

1 3GPP Work Area

X	**Radio Access**
X	**Core Network**
	Services

2 Classification of WI and linked work items

2.0 Primary classification

This work item is a …

	Study Item (go to 2.1)
X	**Feature (go to 2.2)**
	Building Block (go to 2.3)
	Work Task (go to 2.4)

NOTE: Core, Performance and Testing parts of RAN WIs are usually Building Blocks.
If you are in doubt, please contact MCC.

2.1 Study Item

Related Work Item(s) (if any]		
Unique ID	**Title**	**Nature of relationship**

Go to §3.

2.2 Feature

Related Study Item or Feature (if any)		
Unique ID	**Title**	**Nature of relationship**

Go to §3.

2.3 Building Block

Parent Feature (or Study Item)		
Unique ID	**Title**	**TS**

This work item is …

	Stage 1 (go to 2.3.1)
	Stage 2 (go to 2.3.2)
	Stage 3 (go to 2.3.3)
	Test spec (go to 2.3.4)
	Other (go to 2.3.5)

2.3.1 Stage 1

Source of external requirements (if any)		
Organization	**Document**	**Remarks**

Go to §3.

2.3.2 Stage 2

Corresponding stage 1 work item		
Unique ID	**Title**	**TS**

Other source of stage 1 information		
TS or CR(s)	**Clause**	**Remarks**

If no identified source of stage 1 information, justify:

Go to §3.

2.3.3 Stage 3

Corresponding stage 2 work item (if any)		
Unique ID	**Title**	**TS**

Else, corresponding stage 1 work item		
Unique ID	**Title**	**TS**

Other justification		
TS or CR(s) or external document	**Clause**	**Remarks**

If no identified source of stage 2 information, justify:

Go to §3.

2.3.4 Test spec

Related Work Item(s)		
Unique ID	**Title**	**TS**

Go to §3.

2.3.5 Other

Related Work Item(s)			
Unique ID	**Title**	**Nature of relationship**	**TS / TR**

Go to §3.

2.4 Work task

Parent Building Block		
Unique ID	**Title**	**TS**

3 Justification

This WID addresses the issue of increased control plane signalling due to continuous traffic growth.

LTE is a global scale technology excelled by substantial traffic growth experienced since its initial launch and predicted to remain into the future to come. To meet the demands for more traffic capacity and the flexibility to accommodate different types of traffic the main focus so far is/was on the radio interface where a lot of effort has been and is still spent on improving the radio capacity through e.g. increase of spectral efficiency by physical layer improvements .

However, another important aspect of traffic growth is driven by the increasing number of devices and thus the extremely large number of associated connection establishments between the UEs and the network through control plane signalling. The latter needs to be understood as on one hand there is a demand for radio resources to conduct the signalling over the Uu interface, in particular for small data transmissions, while on the other hand there is a requirement on processing capacity and signalling in the deployed infrastructure. The need to put special attention on that area is confirmed by a number of studies in 3GPP, like EDDA, MTC related study items and work items etc.

This WID addresses the need to further reduce signalling overhead between the UE and the network, similarly between the RAN and CN nodes; by maintaining a lightweight connection between the UE and network. Furthermore it enables network nodes to spend more capacity for the traffic growth through spending less processing effort on signalling, especially in case of UEs frequently (re-)establishing connections with the network.

A result of signalling and processing reduction is reduced delay experienced in case of data arrival. Among other factors, UEs' battery lifetime is also reduced by the amount of control plane signalling sustained. Hence signalling overhead reduction will inevitably result in an improved UE battery consumption.

Confining mobility handling at RAN level when lightly connected can further reduce network interface signalling. Additionally, RAN based handling and configuration of Paging can provide more dynamic and optimal setting for these parameters taking into account the UE mobility and traffic pattern.

Signalling on the S1 interface towards CN nodes can also be significant during Idle/Active transition and reduction of this signalling is also quite important. As part of this work, solutions should also consider reduction in the S1 interface signalling to CN.

4 Objective

4.1 Objective of SI or Core part WI or Testing part WI

The objective of this work item is to reduce the radio and network interfaces signalling overhead, and improve the UE access latency as well as UE power consumption for all device types. In particular, the objectives of this work item are:

In the study phase, investigate potential solutions for the following aspects, taking into account both UE mobility and traffic pattern:

- Signalling reduction due to handover, considering UE centric mobility, e.g. cell (re)-selection. (RAN2/3, Q3/2016)
- Signaling reduction due to Paging, considering limiting the Paging transmission within a more limited area. (RAN2/3, Q2/2016)
- Signalling reduction to CN over S1 interface due to mobility and state transitions by hiding them from CN. (RAN2/3, Q3/2016)
- UE context storage and retrieval along with UE mobility across different eNBs. (RAN3/2, Q3/2016)
- Necessity of a new RAN based state (RAN2, Q3/2016)

Then, based on the conclusion of the study phase, specify the corresponding solutions.

If considered beneficial, the solution can consider reusing the Suspend/Resume procedure specified in Rel-13, with necessary enhancements. Any left-over optimization from the User plane solution that could not be completed in time for Rel-13 can also be addressed in this WI.

The solution shall apply for both mobile-originated and mobile-terminated data.

The solution shall enable the UE power consumption to be comparable to that one in RRC_IDLE.

The coordination between RRC and upper layers will be discussed during this work, with involvement of relevant WGs such as RAN3 and SA2.

4.2 Objective of Performance part WI

NOTE: Leave empty if the WI proposal does not contain a RAN performance part.

4.3 RAN time budget proposal

NOTE: For WIs/SIs under RAN WG5 leadership this section is not filled out. Otherwise:
For a not yet approved WI/SI the rapporteur has to fill out the last row of the table(s) below up to the target date of the WI/SI (if necessary add further tables):
Indicate the number of time units (1 TU ~ 2h), i.e. one value for each session/field.
If no time unit is needed, leave the field empty.
Once the WI/SI is approved, the tables below will no longer be updated in the WI/SI description (i.e. the tables reflect the status of the initial approval). But changes can be proposed in the status report of the WI/SI.

RAN #71 Q2/2016 RAN #72																			
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf	R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf
84bis	84bis	93bis	93bis	93bis	91bis	78bis	78bis	78bis	78bis	85	85	94	94	94	92	79	79	79	79
		0.5			**0.5**							**0.5**			**0.5**				

RAN #72 Q3/2016 RAN #73									
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf
86	86	95	95	95	93	80	80	80	80
		1.5			**1**				

RAN #73 Q4/2016 RAN #74																			
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf	R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf
86bis	86bis	95bis	95bis	95bis	93bis	80bis	80bis	80bis	80bis	87	87	96	96	96	94	81	81	81	81
		1.5			**1**							**1.5**			**1**				

RAN #74 Q1/2017 RAN #75									
R1L	R1U	R2L	R2U	R2J	R3	R4RF Core	R4RD Core	R4RF Perf	R4RD Perf
88	88	97	97	97	95	82	82	82	82
		1.5			**1**				

L: LTE, U: UMTS, J: Joint, RD: RRM/demodulation

NOTE: In case further explanation of the time budget proposal is needed, then please explain this below.

additional comments to the time budget proposal:

5 Service Aspects

6 MMI-Aspects

7 Charging Aspects

8 Security Aspects

9 Impacts

Affects:	**UICC apps**	**ME**	**AN**	**CN**	**Others**
Yes		X	X	X	
No	X				
Don't know					X

10 Expected Output and Time scale

New specifications [If Study Item, one TR is anticipated]						
Spec No.	Title	1st rsp. WG	2nd rsp. WG(s)	Presented for information at plenary#	Approved at plenary #	Comments

NOTE: If this is a RAN WID including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Comments for each spec.
By default a new specs can only be new for one of both parts.

Affected existing specifications [None in the case of Study Items]				
Spec No.	CR	Subject of the CR	Approved at plenary#	Comments
36.331		Evolved Universal Terrestrial Radio Access (E-UTRA); Radio Resource Control (RRC); Protocol specification	RAN#74	Core part
36.321		Evolved Universal Terrestrial Radio Access (E-UTRA); Medium Access Control (MAC) protocol specification	RAN#74	Core part
36.306		Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) radio access capabilities	RAN#74	Core part
36.304		Evolved Universal Terrestrial Radio Access (E-UTRA); User Equipment (UE) procedures in idle mode	RAN#74	Core part
36.300		Evolved Universal Terrestrial Radio Access (E-UTRA) and Evolved Universal Terrestrial Radio Access Network (E-UTRAN); Overall description; Stage 2	RAN#74	Core part
36.413		Evolved Universal Terrestrial Radio Access Network (E-UTRAN); S1 Application Protocol (S1AP)	RAN#74	Core part
36.423		Evolved Universal Terrestrial Radio Access Network (E-UTRAN); X2 application protocol (X2AP)	RAN#74	Core part

NOTE: If this is a RAN WID including Core and Perf. part, then all new Core part specs have to be listed first and then all new Perf. part specs. Indicate "Core part" or "Perf. part" under Comments for each spec.
If an existing spec is affected by both (Core part and Perf. part), then it has to be listed twice with appropriate approval dates.

11 Work item rapporteur(s)

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12 Work item leadership

Primary: RAN WG2
Secondary: RAN WG3

NOTE: If this is a RAN WID including Core and Perf. part, then this WG specifies the WG leading the Core part.
RAN WG4 is by default leading the Perf. part.

13 Supporting Individual Members

Supporting IM name
Huawei
Intel
HiSilicon
China Telecom
China Unicom
CMCC
CoolPad
XinWei
Telus
Bell Mobility
TD TECH
CATT
Kyocera
IAESI
Verizon
CHTTL
Asus
Orange
CATR
BlackBerry
Telecom Italia
InterDigital
Deutsche Telekom
Samsung
Neul
Nokia Networks
Alcatel-Lucent
Alcatel-Lucent Shanghai Bell
Telia Sonera
OPPO